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NK-80

NMEA2000 Adaptor

User's Manual



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WARNING!
The equipment said in this manual must only be used to which it was designed. Improper operation or installation may cause damage to the equipment. AMEC will not incur any liability as a result of equipment damage or data loss due to improper usage or installation of the equipment. It is strongly recommended reading this manual and the following safety instructions before proceeding to the installation or operation.

WARNING	WARNING
 **ELECTRICAL SHOCK HAZARD.** Do not disassemble the equipment. Only qualified personnel should service the product.	**PLEASE KEEP AWAY FROM DIRECT WATER CONTACT.** Even though the equipment is waterproof, it is recommended to keep water away from reach. Water leaking into the equipment may cause electrical shock or fire.
TURN OFF THE POWER IMMEDIATELY IF WATER LEAKS IN OR OBJECT DROPS ONTO THE EQUIPMENT. Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor for service.	**AVOID OPERATING THE EQUIPMENT WITH WET HANDS.** Despite the fact that it is safe, but like any other electric appliances, operate with dry hands.

FOREWORD

Congratulations on the purchase of NK-80 NMEA 2000 adaptor. NK-80 NMEA 2000 adaptor is clever designed to enable communication between NMEA 2000 and NMEA 0183. Unless improper used, installed, or maintained, the equipment should perform at its optimum.

The operation instructions contained in this manual is applied only to NK-80. AMEC and the authorized local agent/dealer will not bear any responsibilities of damages resulted from improper installations made by unauthorized agent/dealer.

We thank you for choosing our product

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1. NK-80 Introduction

1.1. What is NMEA 2000?

The NMEA 2000 transmits data through Controller Area Network (Can Bus). It simplifies the connections and enables information sharing among different devices through a single trunk cable. Compared with NMEA 0183 in “RS422” interface, NMEA 2000 has better transmission reliability and shares data easier in a network.

1.2. NK-80 Overview

NK-80 NMEA 2000 adaptor (as known as NK-80) is a gateway between NMEA 0183 electronic devices and NMEA 2000 device/network. NK-80 allows users to connect their existing NMEA 1083 devices to the NMEA 2000 network.



The key features of NK-80 are shown as follows:

High-Performance 32-bit RISC CPU has a performance of 80 DMIPS to manage high traffic loading of NMEA data transactions.

Build-in memory storage with 64KB RAM and 256KB Flash ROM, it is more effective to control the dataflow.

Configurable through a serial connection allows users to monitor/control NMEA data transactions.

NMEA 2000 Certified ensures product quality is reliable in most extreme conditions.

Isolated power is provided through NMEA 2000 network, NK80 requires no additional battery source.

2. Installation

2.1. Items in the Package

The NK-80 standard package is listed in Table 2.1. It is also illustrated in Figure 2.1.

Table 2.1 Standard Equipment List

No.	Description	Qty
1	AMEC NK-80 NMEA 2000 adaptor	1
2	Manual	1
3	Screw M4	4
4	CD	1

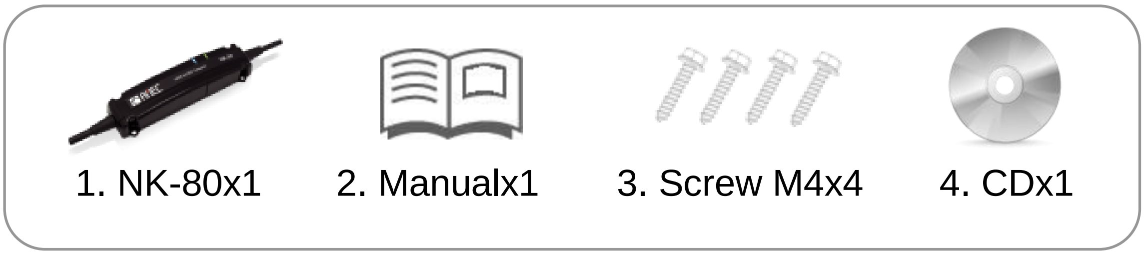
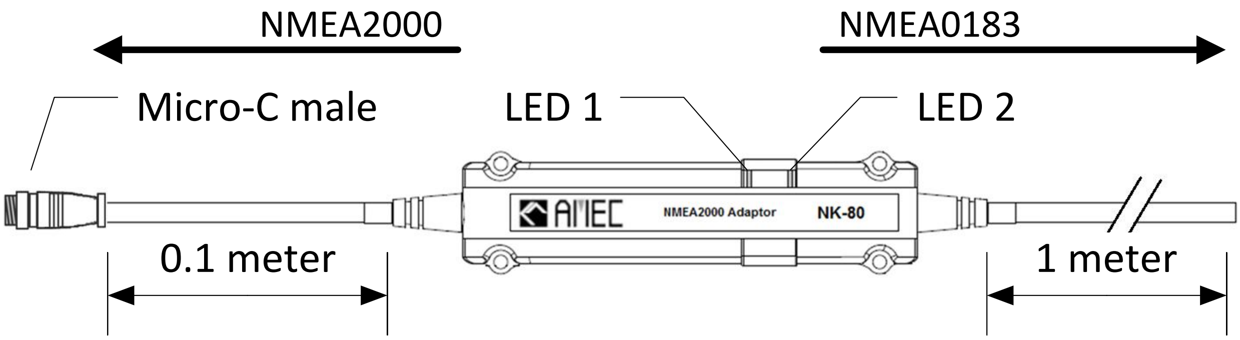


Figure 2.1 Standard Package

2.2. Connection

Diagram below shows the physical attributes of NK-80.



2.2.1. NMEA 2000 Connections

The Micro-C male connector is an NMEA 2000 standard connector. Connect this connector to any available Micro-C female connector in the NMEA2000 network.

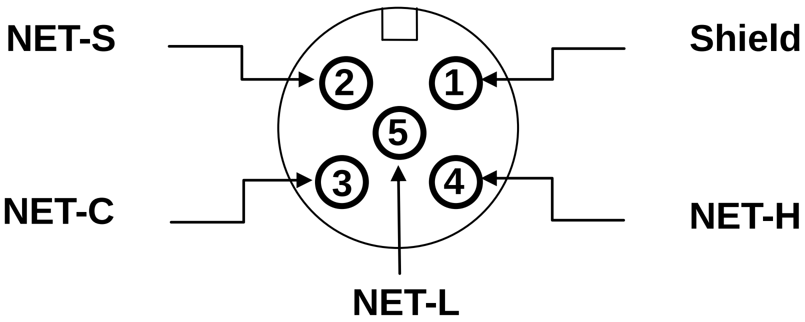


Figure 2.2.1 Pin Definitions of the Micro-C Male Connector

2.2.2.NMEA 0183 Connections

The NMEA 0183 cable provides flexible wiring to devices. Please follow the NMEA 0183 cable description below when wiring to an NMEA 0183 device.

Table 2.2.2. Wire Information for NMEA 0183 Cable

Pin	Wire color	Name	Function
1	RED	TXP	Positive(＋); NMEA 0183 Data output
2	GREEN	TXN	Negative (－); NMEA 0183 Data output
3	BLACK	RXP	Positive(＋); NMEA 0183 Data input
4	BLUE	RXN	Negative (－); NMEA 0183 Data input
5	SHIELD	GND	Ground

- **Wiring NMEA 0183 to NMEA 0183/RS-422 Device**

Please follow the wiring diagram below to connect an NMEA 0183/RS-422 device.

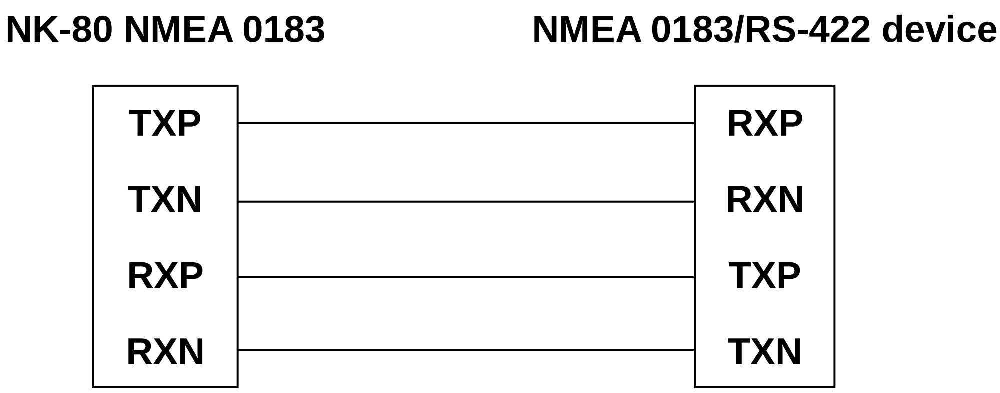


Figure 2.2.2.1-1 NMEA 0183 to RS-422 Connection

<u>NOTE:</u> Please ensure the connecting device is fully NMEA 0183 compliant.

- **Wiring NMEA 0183 to RS-232/PC**

  Please follow the wiring diagram below to connect to RS-232/PC

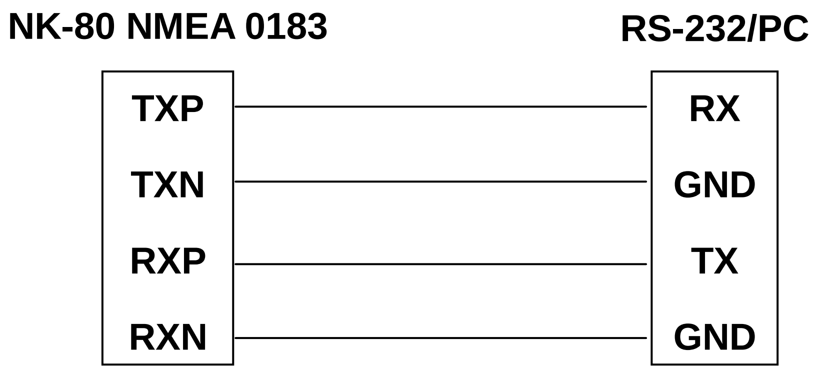


Figure 2.2.2.1-2 NMEA 0183 to RS-232 Connection

NOTE: Please ensure the wire definitions of RS-232/PC are correct during wiring.

3. Operation

3.1. Operation in NMEA 2000 Network

NK-80 NMEA 2000 adaptor converts messages from NMEA 2000 to NMEA 0183 and vice versa. NK-80 enables NMEA 0183 devices to communicate to a NMEA 2000 network.

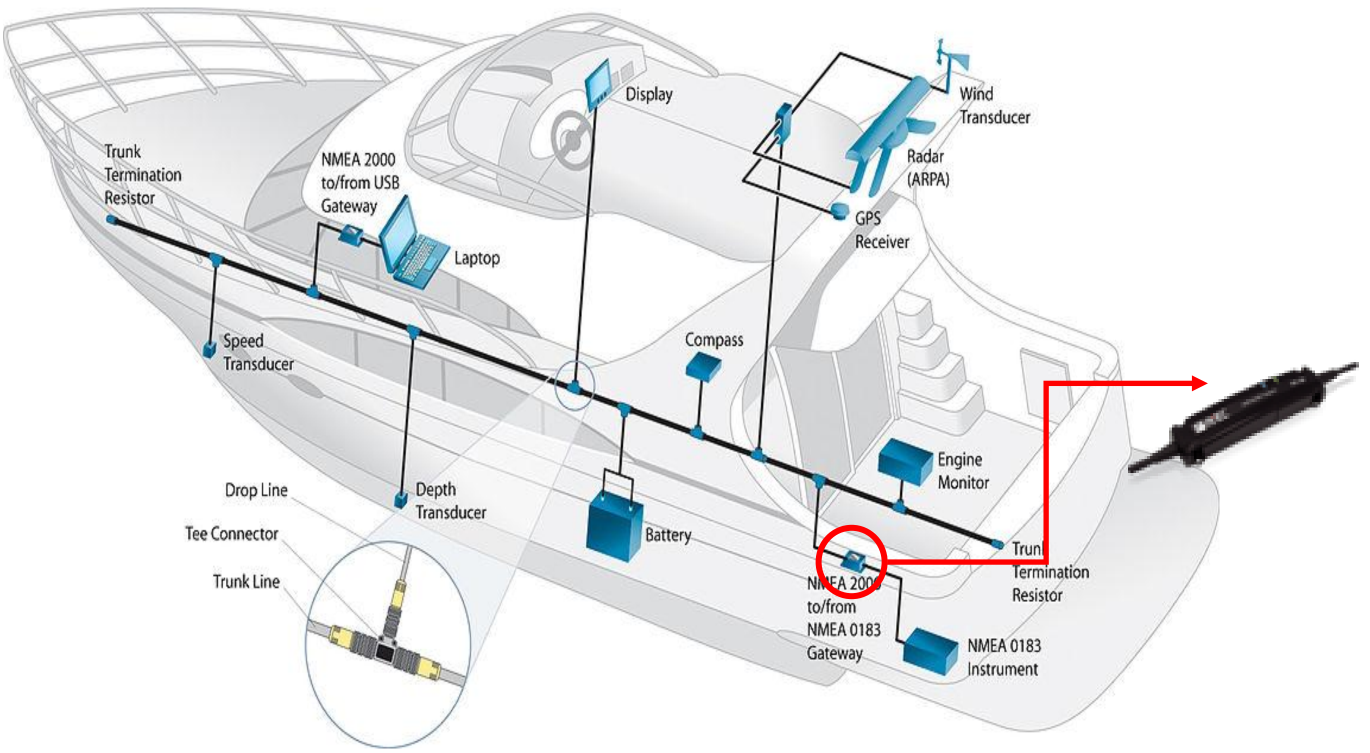


Figure 3.1 NK-80 in an NMEA 2000 Network (reference from NMEA association)

3.2. LED Indication

NK-80 has two LED indicators: LED 1 and LED 2.

- LED 1 flashes blue light when processing/receiving NMEA 2000 messages.
- LED 2 flashes green light when processing/receiving NMEA 0183 messages.



Figure 3.2　LED Indication of NK-80

The details on indicators statuses are shown in the following table.

Table 3.2　Description of Indicator Statuses

Indication	Status	Description
LED 1 ●(Blue)	Flash	Receiving NMEA 2000 messages
LED 2 ●(Green)	Flash	Receiving NMEA 0183 messages
LED 1 ●(Blue) LED 2 ●(Green)	Flash simultaneously in a 5 seconds interval	Normal Operation
LED 1 ●(Blue) LED 2 ●(Green)	Steady	During Firmware Upgrading
LED 1 ●(Blue) LED 2 ●(Green)	Flash takes more than 5 seconds	System/Power Failure*

NOTE: If it takes more than 5 seconds to see LED activities, please verify your NMEA 2000 network power output voltage.

3.3. Configuration Utility

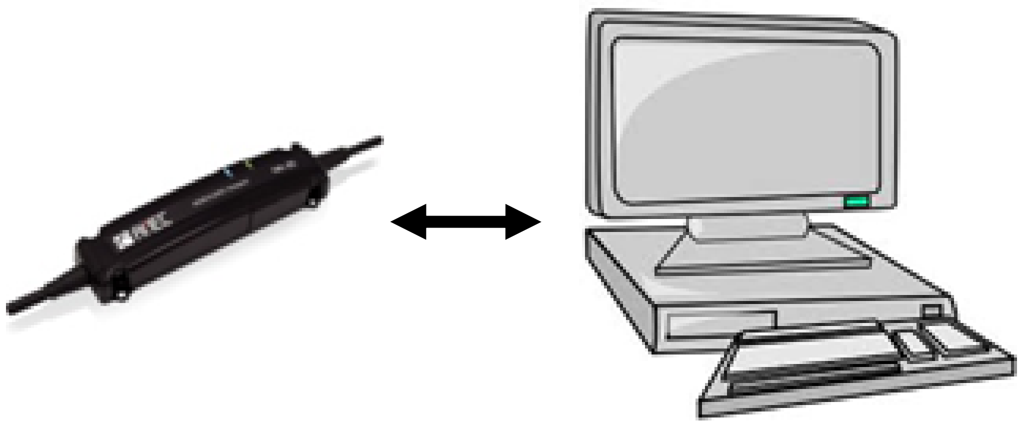
In a general usage, no configuration is required for the NK-80 NMEA 2000 adaptor to work.

For advanced operations*, NK-80 provides the following configuration settings.

- Change default NMEA 0183 baud rate (38,400 bps)
- Filter NMEA 0183 / NMEA 2000 output messages
- Save NMEA 0183 output message log

How to configure NK-80 NMEA 2000 adaptor?

Step 1: Connect NK-80 NMEA 2000 adaptor to PC through RS-232/USB and ensure power is available from the NMEA 2000 network.



***NOTE:** PC connection is required for advanced configuration.

Step 2: Run AMEC NMEA Configuration utility.

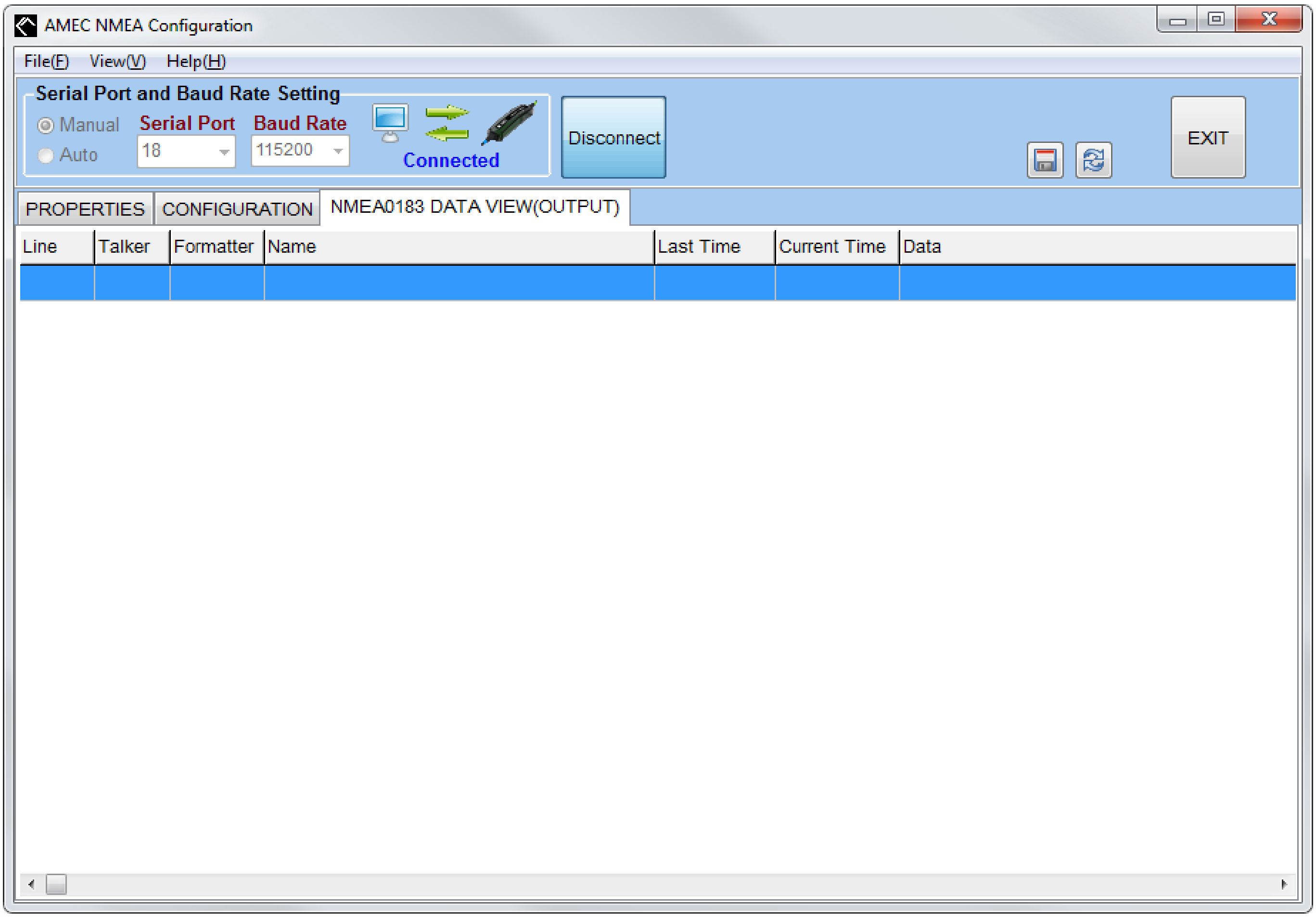


Figure 3.3-1 AMEC NMEA Configuration Utility

Step 3: Manually enter port value and NMEA 0183 baud rate. If unknown, choose **Auto**. Now, click **Connect** to connect NK-80.

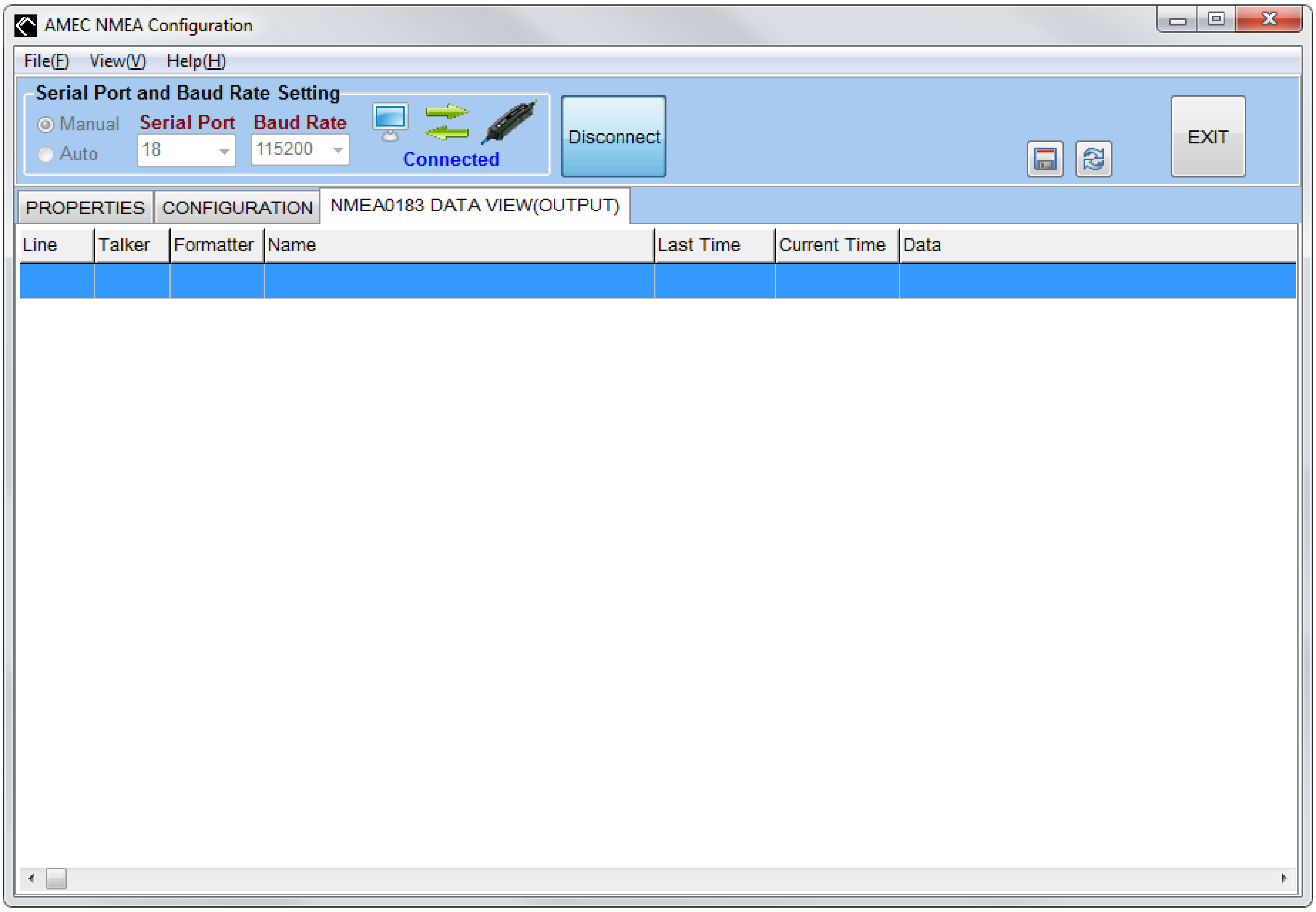


Figure 3.3-2 Configuration Utility Connected to PC

3.3.1.Change NMEA 0183 Default Baud Rate (38,400 bps)

At the **PROPERTIES** tab, click on the **Change NMEA Baud Rate** button. Choose the desired baud rate and click on the **Apply** button.

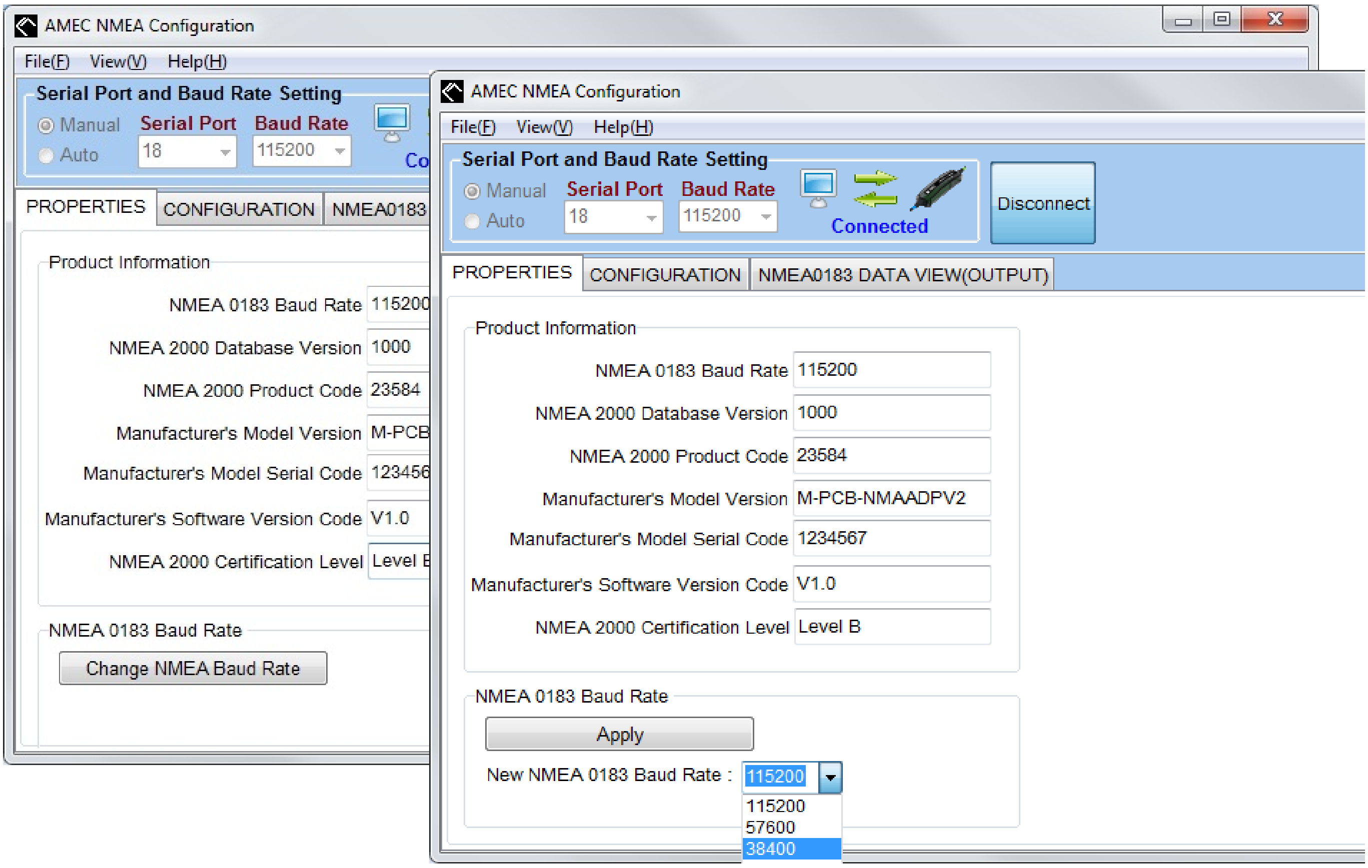


Figure 3.3.1 Properties Tab

3.3.2.Filter NMEA 0183 / NMEA 2000 Output Messages

Step 1: At the **CONFIGURATION** tab, expand the message list on the left and click on a desired message to configure.

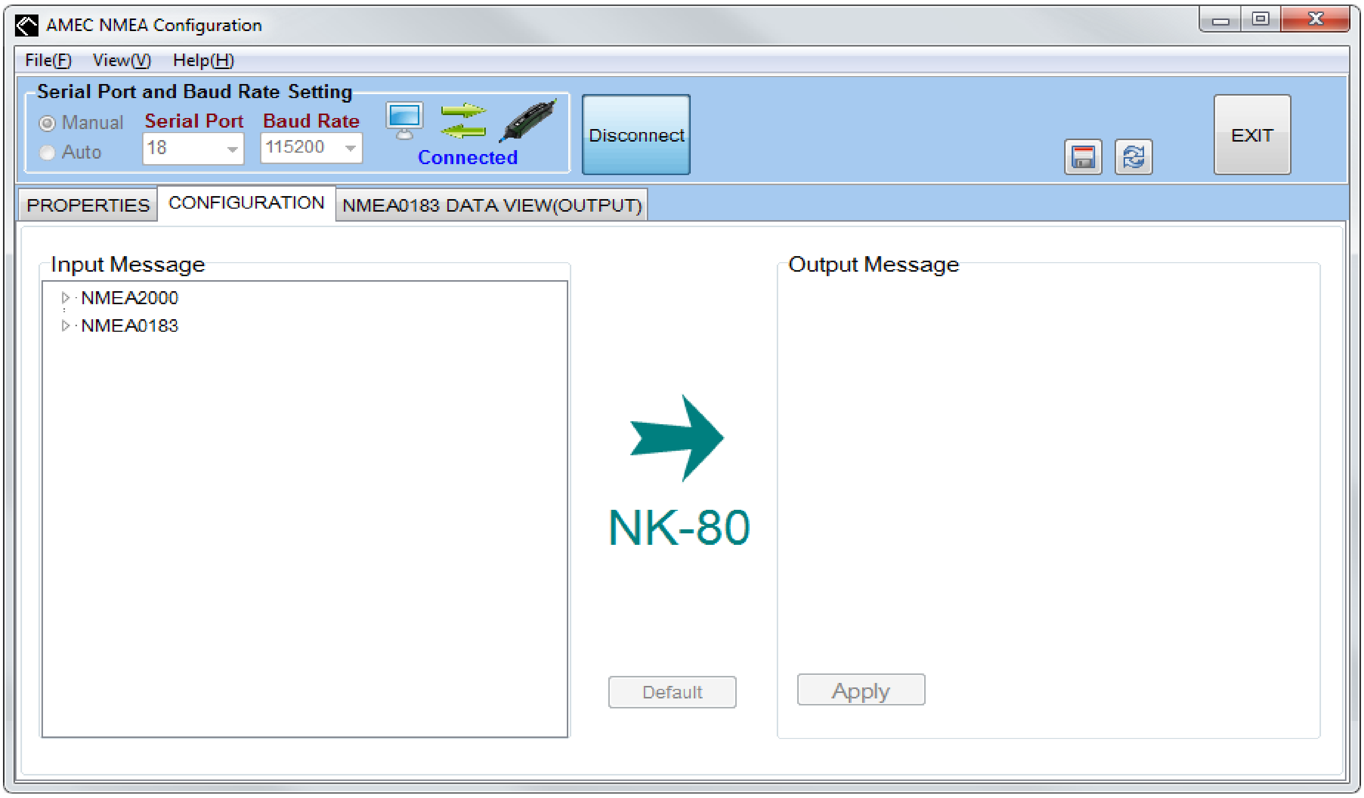


Figure 3.3.2-1 NMEA Message Filtering

HINT: Double click to expand the message groups will show their message names.

Step 2: Once clicked on the desired message, the message properties will reveal on the right panel. On the panel choose the needed attributes and click on **Apply**.

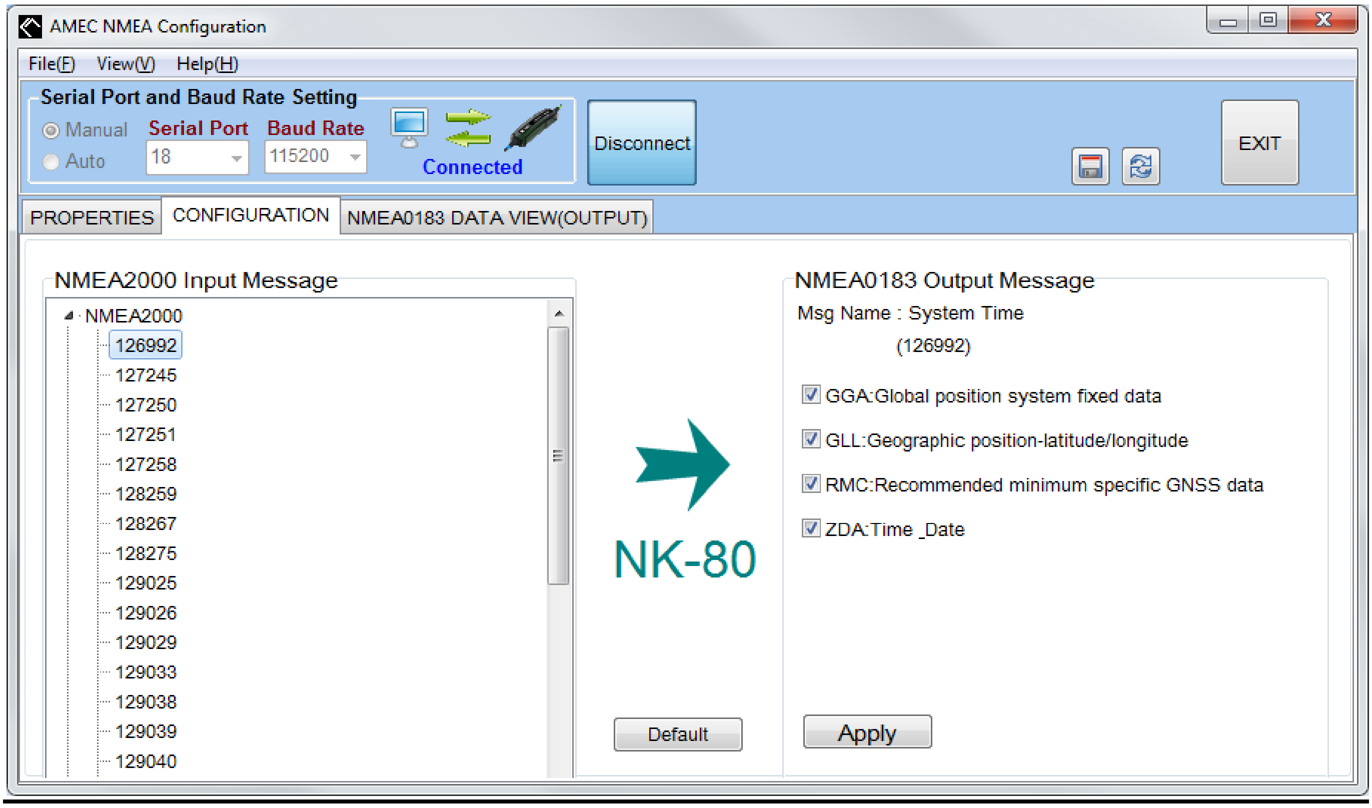


Figure 3.3.2-2 NMEA Message Filtering

Note: All message settings are enabled in factory default. The **Default** button restores all message settings back to factory default.

3.3.3.Save NMEA 0183 Output Message Log

Click on the **NMEA 0183 DATA VIEW (OUTPUT)** tab to view message log history.

To record a log session, click on the disk button to start recording. The system will prompt you first to save the log. It continues logging till the icon is click again.

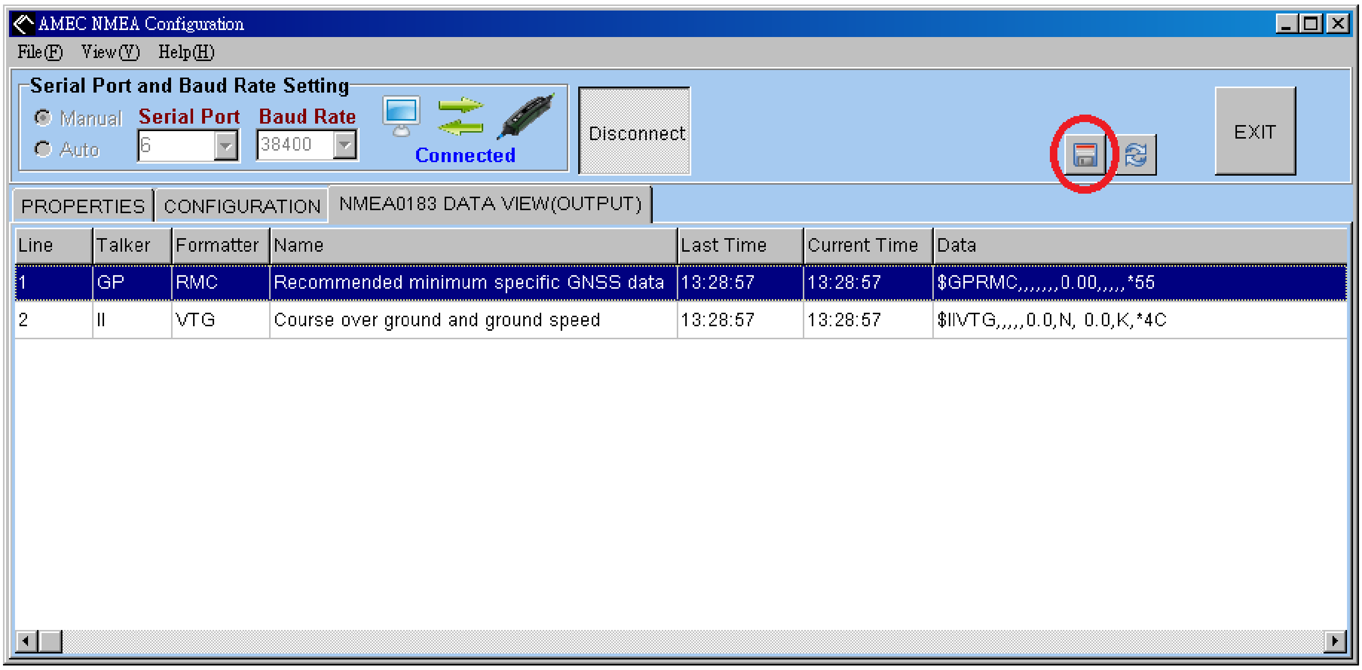


Figure 3.3.3-1 NMEA 0183 Data Log

<u>**NOTE:**</u> NK-80 configuration utility can only log NMEA 0183 output sentences processed from NMEA 2000 messages.

Shown below is the content of a log file.

```
Start Time (13:15:36)
Time        Message Type    Data
====        ============    ====
13:16:34    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:34    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:34    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:34    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:36    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
End Time (13:16:45)
```

Figure 3.3.3-2 A Sample Log File

4. Appendix

4.1. Product Specifications

APPLICABLE STANDARDS

NMEA 2000 standard version1.2 (2004)

CERTIFICATIONS

NMEA 2000 ®

NMEA 2000 CAN Bus line Transmitter

Parameter	Conditions	Min.	Max.
Recessive bus voltage	VTXD = VDD; no load.	2.0V.	3.0V.
Dominant bus voltage NET-H	VTXD = 0.8V	2.75V	4.5V
Dominant bus voltage NET-L	VTXD = 0.8V	0.5V	2.25V
Recessive differential output voltage	VTXD = 2V; no load	-500mV	50mV
Dominant differential output voltage	40Ω < RL < 60Ω	1.5V	3.0V

NMEA 2000 CAN Bus line Receiver

NET-H, NET-L common-mode input resistance	typical 100 KΩ
Differential input resistance	typical 100 KΩ

Input/Output

Configurable Baud rate	4,800, 9,600, 38,400 (default), 57,600, 115,200 bps

Environmental

Operation Temperature	-20°C~+55°C
Storage Temperature	-25°C~+70°C
Water Proofing	IP54
Humidity	0~80%RH

PHYSICAL

Length	132 mm
Width	30 mm
Height	22.8 mm
Cable Lengths	NMEA 2000 cable: 0.1m
	NMEA 0183 cable: 1 m
Weight	< 150 g

ELECTRICAL

NMEA 2000 Load Equivalency Number (LEN)	1 (under 50 mA)

POWER SUPPLY

Supply Voltage from CAN Bus	12VDC / 24VDC (Typical)

4.2. Dimension

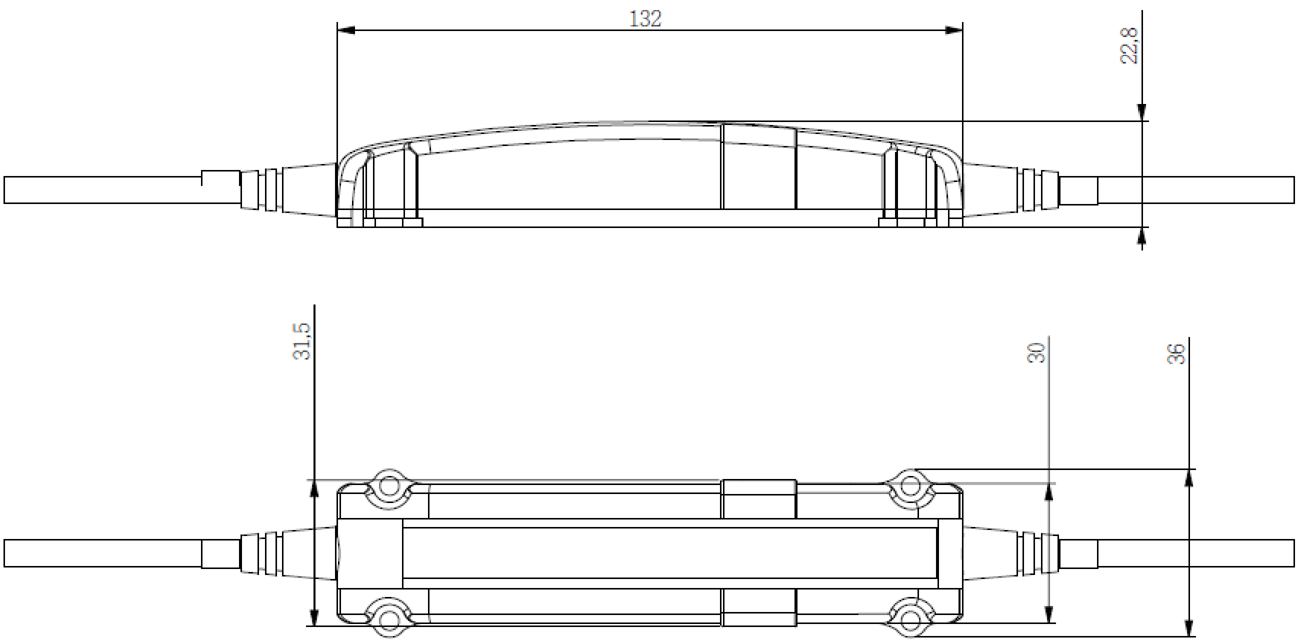


Figure 4.2 NK-80 Main Body Dimension (mm)

4.3. PGN Information

Table 4.3 PGN Information

Transmit		Receive	
PGN	**Description**	**PGN**	**Description**
59392	ISO Acknowledgment	**59392**	ISO Acknowledgment
59904	ISO Request	**59904**	ISO Request
60928	ISO Address Claim	**60928**	ISO Address Claim
126464	PGN List - Transmit PGN's group function	**126992**	System Time
126992	System Time	**127245**	Rudder
126996	Product Information	**127250**	Vessel Heading
127245	Rudder	**127251**	Rate of Turn
127250	Vessel Heading	**127258**	Magnetic Variation
127251	Rate of Turn	**128259**	Speed, Water referenced
127258	Magnetic Variation	**128267**	Water Depth
128259	Speed, Water referenced	**129025**	Position, Rapid Update
128267	Water Depth	**129026**	COG & SOG, Rapid Update
129025	Position, Rapid Update	**129029**	GNSS Position Data
129026	COG & SOG, Rapid Update	**129033**	Time & Date
129029	GNSS Position Data	**129038**	AIS Class A Position Report
129033	Time & Date	**129039**	AIS Class B Position Report
129038	AIS Class A Position Report	**129040**	AIS Class B Extended Position Report
129039	AIS Class B Position Report	**129041**	AIS Aids to Navigation (AtoN) Report
129040	AIS Class B Extended Position Report	**129283**	Cross Track Error
129041	AIS Aids to Navigation (AtoN) Report	**129284**	Navigation
129283	Cross Track Error	**129539**	GNSS DOPs
129284	Navigation	**129540**	GNSS Sats in View
129539	GNSS DOPs	**129792**	AIS DGNSS Broadcast Binary Message
129540	GNSS Sats in View	**129793**	AIS UTC and Date Report

129792	AIS DGNSS Broadcast Binary Message	**129794**	AIS Class A Static and Voyage Related Data
129793	AIS UTC and Date Report	**129795**	AIS Addressed Binary Message
129794	AIS Class A Static and Voyage Related Data	**129796**	AIS Acknowledge
129795	AIS Addressed Binary Message	**129797**	AIS Binary Broadcast Message
129796	AIS Acknowledge	**129800**	AIS UTC/Date Inquiry
129797	AIS Binary Broadcast Message	**129801**	AIS Addressed Safety Related Message
129800	AIS UTC/Date Inquiry	**129802**	AIS Safety Related Broadcast Message
129801	AIS Addressed Safety Related Message	**129803**	AIS Interrogation
129802	AIS Safety Related Broadcast Message	**129804**	AIS Assignment Mode Command
129803	AIS Interrogation	**129805**	AIS Data Link Management Message
129804	AIS Assignment Mode Command	**129806**	AIS Class A Position Report
129805	AIS Data Link Management Message	**129807**	AIS Group Assignment
129806	AIS Class A Position Report	**129808**	DSC Call Information
129807	AIS Group Assignment	**129809**	AIS Class B “CS” Static Data Report, Part A
129808	DSC Call Information	**129810**	AIS Class B “CS” Static Data Report, Part B
129809	AIS Class B “CS” Static Data Report, Part A	**130306**	Wind Data
129810	AIS Class B “CS” Static Data Report, Part B	**130311**	Environmental Parameters
130306	Wind Data	**130312**	Temperature
130311	Environmental Parameters		
130312	Temperature		

4.4. NMEA0183 Information

Table 4.4 NMEA0183 Information

Formatter mnemonic code	Name
RMC	Recommended minimum specific GNSS data
GSA	GNSS DOP and active satellites
GGA	Global positioning system (GPS) fix data
GSV	GNSS satellites in view
GLL	Geographic position – latitude/longitude
VTG	Course over ground and ground speed
ZDA	Time and date
VDM	AIS VHF data-link message
VDO	AIS VHF data-link own-vessel report
DSC	Digital selective calling information
RSA	Rudder sensor angle
VHW	Water speed and heading
VLW	Dual ground/water distance
DPT	Depth
DBT	Depth below transducer
XTE	Cross-track error, measured
APB	Heading/track controller (autopilot) sentence B
ROT	Rate of turn
VWR	Relative Wind Speed and Angle
MWV	Wind speed and angle
MWD	Wind direction and speed
MTW	Water temperature
VDR	Set and drift